

SPATIAL DISTRIBUTION AND LANDUSE PLANNING OF INFORMAL AUTOMOBILE WORKSHOPS IN OSOGBO, NIGERIA

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Abstract

It is against the background of the increasing incidence and indiscriminate springing up of informal automobile workshops in virtually every open space in Nigerian cities that this study evaluates the spatial distribution of informal automobile workshops in Osogbo. This is with a view to identifying planning strategies for addressing the seemingly uncontrollable proliferation of informal workshops in the city. Global Positioning System was used to obtain coordinates of identified informal automobile workshops, while questionnaire administration to senior artisans was used to capture data pertaining to the activities and other related issues of their workshops. The study discovers that there is an average of 4 complementing units in each of the sixty-nine 'visible' workshops identified in the town. With First Order Nearest Neighbour Analysis index of 1.02, informal automobile workshops are randomly located in the town. Hence, informal automobile workshops can spring up beside, behind or within any form or type of land use along major road to distort the existing land use plan (if any). This is observed to be a great challenge for maintaining order in the city. The study therefore, recommends the establishment of mechanic complex, organization and formalization of automobile activity or land use as well as enforcement of development control, among others.

Keywords: Spatial distribution; Informal Sector; Land use

Introduction

Automobile workshops, also known as garages (Wikipedia, 2014), are places where automobiles are repaired by artisans which include mechanics, rewires, battery chargers, upholstery makers and vulcanizers, among others. Their locations, like several other informal activities, are without formal arrangement (Onyemaechi, 2013) and as such remain unpredictable. This characteristic makes their potential impacts difficult for evaluation. Little wonder, provision for informal

establishments in form of policies and more importantly, infrastructure is mostly grossly inefficient, because there is no record for them in the first instance. The point of concern remains that the population of these informal establishments outweighs that of their formal counterparts. Even in some cases, capacities of those of the former are more than those of the latter, particularly in Nigerian setting.

Not only as an element of urban fabric have informal automobile workshops

existed but also as an important part of urban land use and economy, as the 'industry' provides opportunities for jobless teeming population and comparatively cheaper services for the populace. It is also not only a reflection of the gap between formal establishment efficiency and required services, but also that of the inadequate capacities of development control agencies. The economic system is complex and dwindling while the resultant effect of this is obvious on the springing up of informal businesses and services, and the implication of same for the aesthetic characteristics of the environment in which they operate.

Although the informal nature of the automobile workshops suggests that it will be fraught with quack and sub-professional services, they constitute an important aspect of urban land use and economy. Their location and organization must therefore be aimed at achieving a balance between proximity to service and the demand for harmonized aesthetics. Studies like this in spatial planning would lead to a better understanding of the distribution of informal automobile workshops, help dissect the dynamics of informal urbanization and further give direction to such urbanization thereby formalizing it.

Literature Review

The capacity of informal sector economy to absolve a teeming population of the unemployed into the labour force has posed a considerable challenge to urban land use planning and management in the developing countries (Samson *et al.*, 2006). This, on the one hand is because much of what humans do requires land (Young, 1998) and on the other, it is due to the non-definite spatial pattern as well as the unpredictable nature of this type of

land use. The mechanism of the informal land is usually ignored and hardly understood and documented (Mabogunje, 2002). Hence, managing the informal sector syndrome through land use zoning or classification poses a challenge (Jelili and Adedibu, 2006).

The sumptuous side of informal sector as accounted for by Samson *et al.*, (2006) includes the more provision of jobs than its formal counterparts. This they (Samson *et al.*, 2006) approximate to 10 informal jobs to every 1 formal job but the negativities associated with this land use especially within the urban fabric where their dominance is felt include urban sprawl, building alteration, menace of temporary structure, alteration of land use plan/function, open space conversion and land use degradation (Okeke, 2000). However, Informal sector not only plays a significant role in the urban economy but constitutes an important component of it and an integral part of the urban resident culture in Africa (Jelili and Adedibu, 2006). It is a product of national and regional inequalities due to the changing economic nature of nations and the lack of appropriate policies to mitigate the effects of change (Abraham, 1964; Oluwafemi, 2010). It has become the engine of the urban economy, particularly in Nigeria.

For the issue to be put in the right perspective, it is necessary to establish its growing history in Africa, particularly in Nigeria. Informal activities are more pronounced in cities of developing nations such as Lagos, Ibadan, Osogbo all in Nigeria, Kampur, Lesotho and Johannesburg in South Africa among other places in Africa and other developing countries. The increasing rate of unemployment in the country, especially since the era of Structural Adjustment

Programme (SAP) and creation of the National Directorate of Employment Policy of the 1980s (during economic recession), has been having informal sector as an escape route for the less privileged and unemployed. The activities got firmly rooted in the sustenance of the nation's economy with the introduction of the SAP in 1988 and since then have in various forms, scopes and dimensions sustained the economy as well as dotted the physical landscape of the country (Oluwafemi, 2010 citing Abrams, 1964 and Turner, 1977).

From the foregoing, there is every need for the accommodation of informal land use. Also, the urban fabric cannot be left to be infected by this phenomenon. This calls for the swift action of land use planners through efficient land use planning and development control. To achieve a sustainable informal land use development, there is need to identify the spatial pattern of the activities and its implication for effective land use planning. It is rather unfortunate that inadequate research efforts have been carried out in this area, particularly from land use planners' perspectives. While Okeke (2000) and Onyebueke (2000) establish the link between informal land use, residential land use and density, Jelili and Adedibu (2006) note the recognizable pattern between informal land use and transport route hierarchy in Ogbomoso Township. They (Jelili and Adedibu) opine further that there is a positive correlation between the intensity of informal activity and type of dominant land use in the area. None of them has been able to adequately extend the spatial distribution argument to how to get it integrated into formal land use planning, particularly with respect to informal workshops. This study is an attempt in this direction. It examines the

spatial distribution of informal automobile workshops (an informal land use) in Osgobo, and proposes modalities for formalizing the control of the land use.

Study Area

Osogbo is located about 96 kilometers by rail and 96 kilometers by road North-East of Ibadan, the capital of Oyo state. It is 100 kilometers by road South of Ilorin (the capital of Kwara State) and 115 kilometers North West of Akure (the capital of Ondo State). Osogbo is the state capital of Osun State and the administrative headquarter of the state. The geographical location of the city is around longitude 4°5' E of the Greenwich and 7°0' N of the equator. Its distance ranges between 32km and 48km to other major towns within the state like Ikirun, Ede, Iwo, Ile-Ife, Ilesha, Ila Orangun and Ikire.

Osogbo town comprises two Local Government Areas which are Osogbo Local Government and Olorunda Local Government (Yisau, 2009). Situated on the margin of the Southern forests of Nigeria, Osogbo enjoys a raised parcel of land which is about 500m above sea level. It is drained by River Osun and its tributaries such as River Ogbaagba, River Gbadofon, River Okorokoro (Okooko), Olohunkoro and other streams. The land is made of Pre-Cambrian rocks, the so called basement complex from which the fairly fertile clayed loam of the surrounding district is derived

Methodology

Roads in the city were functionally classified into categories. Global Positioning System was used to obtain coordinates of identified informal automobile workshops on either side of the roads in the study area. Obtained coordinates of informal automobile

workshops were exported to AutoCAD 2010 environment (using script command (scr.) which has been geo-referenced with the existing base map gotten from Google earth pro application as well as map from Osun State Ministry of Physical Planning. The new map was further processed in arc 3.2a environment. With this, relative distances between workshops and the nearest ones were obtained and used for Nearest Neighbour Analysis.

Nearest neighbor index was used in explaining the spatial distribution pattern of the workshops. The nearest neighbor index measures the degree of spatial dispersion in the distribution based on the minimum of the inter feature distance. It uses the distance between each point and its closest neighboring point to determine if the point pattern is random, regular or clustered (Amarina, 2007). Nearest neighbor index ranges from 0.0 to 2.15 where 1.0 means complete randomness of the entities. However, index lesser than 1.0 indicates clustering and index higher than 1.0 indicates dispersal.

Also, method of land acquisition and adjoining land uses to informal automobile workshops, among other land use related matters were obtained with the aid of direct observation and questionnaires which were administered to most senior artisans in the identified workshops.

Results and Discussion

Spatial Distribution Pattern of Informal Automobile Workshops

Informal automobile workshops are discovered to align linearly along road networks. The spatial distribution pattern of informal automobile workshops is informed by two primary factors which are access and quest for mobile customers. These two factors will be discussed in detail.

Access: The quest of automobile artisans for access is driven by their objects which are automobiles. Meanwhile, the relationship between either the quantum of automobile artisan activities or the size of the informal automobile workshop and the accessibility level of the informal automobile workshops has not been so established in the existing literature, but central to all workshops is access.

Quest for Mobile Customers: The mobile nature of motorists demands the swift response of artisans because except from minor faults which can be paused till either the vehicle is driven to the routine artisan; automobile faults are in most cases repaired by closest artisans to the location of the fault. Since most of the faults take place on road, artisans locate along major roads to catch the next available customers, not minding whether or not the locations where they are will distort any existing land use plan or have negative impacts on the adjoining or nearby land uses.

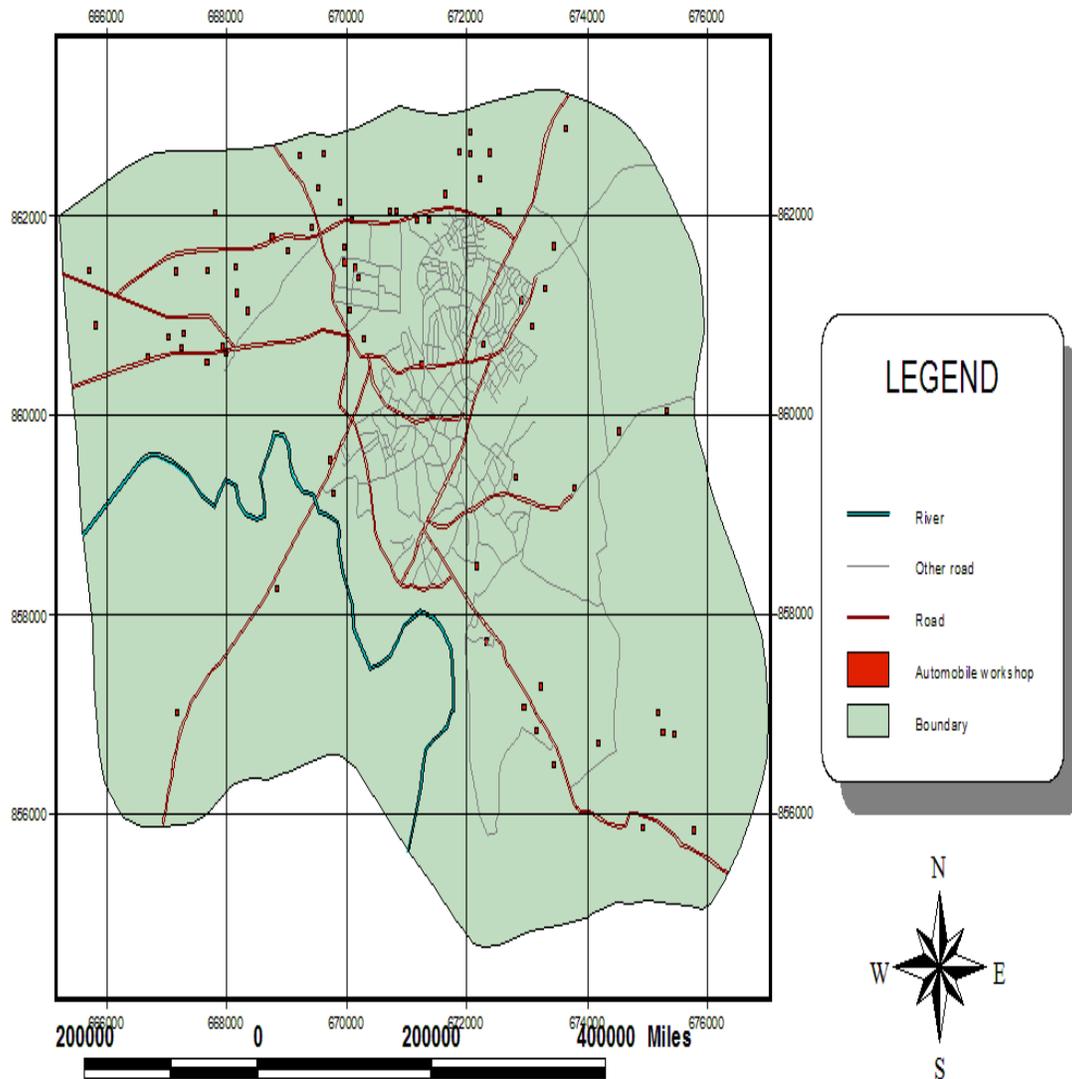


Fig 1: Spatial Distribution of Informal Automobile Workshops in Osogbo

For the nearest neighbor index of informal automobile workshops in Osogbo whose total land area is 47km square (Osun State Government, 2015) and the total distance among all identified informal automobile workshops of 29.47km (Authors work, 2015. See appendix 5), the following are obtained:

$$d(NN)= 0.42$$

$$d(ran)= 0.41$$

$$N.N.I = 0.42/0.41$$

$$\text{First Order Nearest Neighbour index} = 1.02$$

$$\text{Second Order Nearest Neighbour Index} = 1.60$$

$$\text{Third Order Nearest Neighbour index} = 1.60$$

$$\text{Fourth Order Nearest Neighbour index} = 1.60$$

$$\text{Test of Significance (z)}$$

$$Z = \frac{d(NN) - d(ran)}{S.E}$$

$$S.E = 0.02$$

Hence

$$Z = (0.42 - 0.41) / 0.02$$

$$Z = 0.01 / 0.02$$

$$Z = 0.5$$

Where S.E (standard error)
 $= 0.26136 / (\sqrt{N^2/A})$
 S.E = 0.26136/10.06

Table 1: Nearest Neighbour Index Summary

MEAN NEAREST NEIGBOUR INDEX	0.42
MEAN RANDOM DISTANCE	0.41
FIRST ORDER NEAREST NEIGHBOUR INDEX	1.02
SECOND ORDER NEAREST NEIGHBOUR INDEX	1.60
THIRD ORDER NEAREST NEIGHBOUR INDEX	1.60
FOURTH ORDER NEAREST NEIGHBOUR INDEX	1.60
STANDARD ERROR	0.02
Z test of significance	0.5
P value	0.19
α level	0.05

The above calculation reveals that with a nearest neighbor index of 1.02, automobile workshops are randomly located in Osogbo town. Further analysis carried out (which is Z test of significance) revealed that with a p-value of 0.19 which is greater than α - level of 0.05, the spatial distribution of informal automobile workshops is not statistically different from random. Hence, the hypothesis that informal automobile workshops are not randomly distributed is rejected. An in-depth spatial analysis through the introduction of 2nd order Nearest Neighbor with an index of 1.60 indicates that though it tends towards dispersal, there is a considerable degree of randomness in the distribution of informal automobile workshops. This situation is however cemented as 3rd and 4th order analysis also has an index of 1.60 each. Though relatively randomly distributed, informal automobile workshops are located linearly

along road networks. (See table 5). The implication of this is that informal automobile workshops can spring up beside, behind or within any form or type of land use along major road to distort the existing land use plan (if any) if not properly managed.

Number of Units and Artisans

An average of approximately 4 complementing units per workshop is observed in the town (Figure 1). However, the number as well as type of units available in a workshop depends greatly on the available space, available areas of specialization and interpersonal relationship between artisans. As revealed in Figure 2, the average population of artisans in each informal automobile workshop is 12. These twelve artisans may or may not include apprentice. Meanwhile, the total number of artisans in a workshop depends greatly on the number of units as well as the size of the workshops.

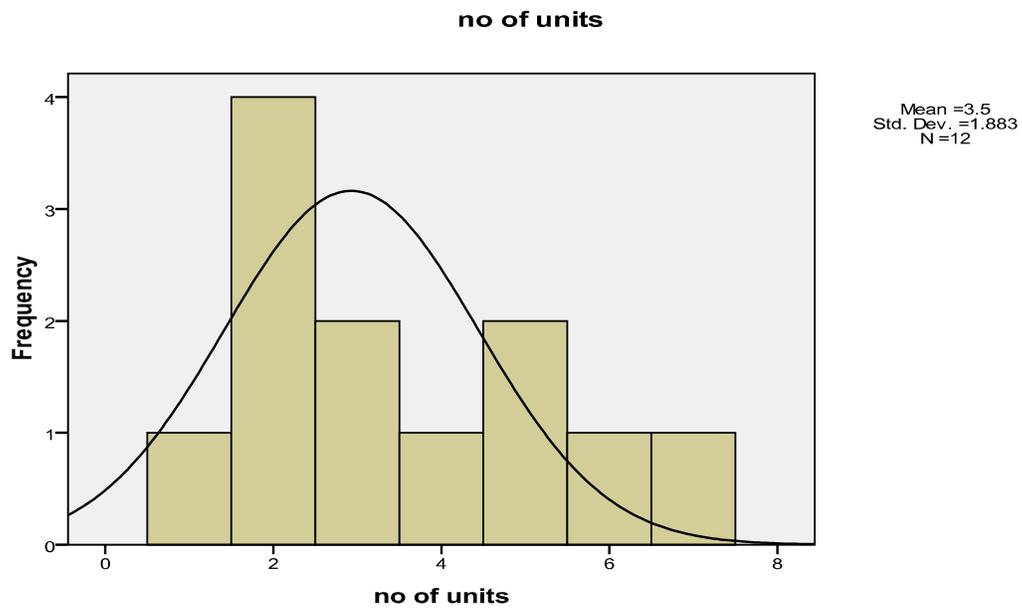


Fig 1: Number of Units in Informal Automobile Workshops

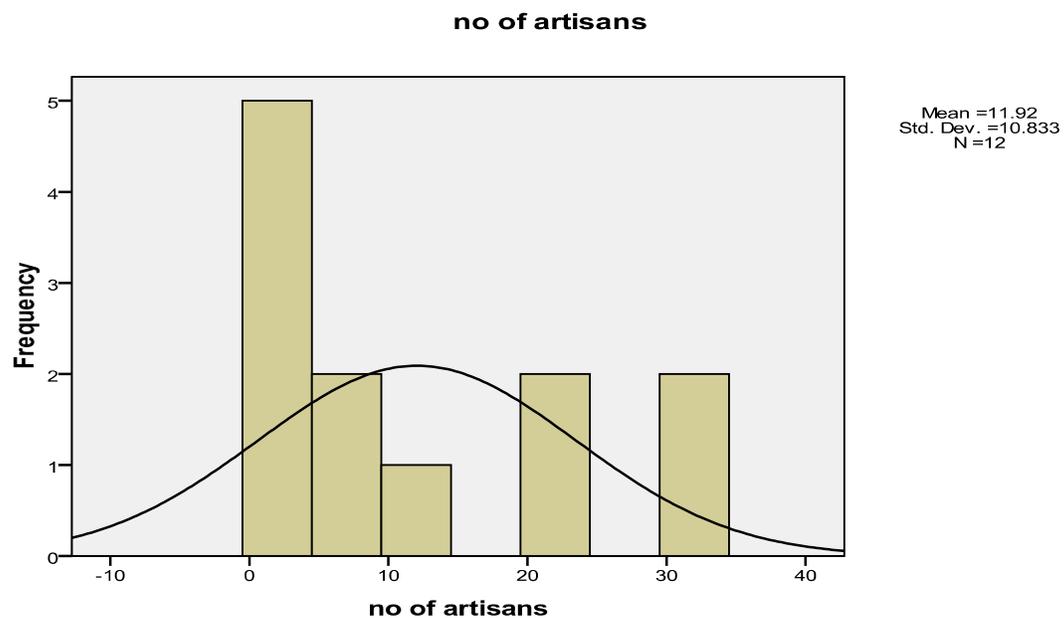


Fig 2: Number of Artisans in Informal Automobile Workshops

Distance to Adjoining Land Use

The average setback of informal automobile workshops in the study area from the road and adjoining land uses is 10.17m and 6.35m, with standard

deviations of 4.8 and 3.9 respectively (Table 1). Since the acreage demand of artisan activities is large and most of them locate freely on large expanse of land, adequate setback to adjoining land use

should be maintained. These setbacks are used as parking space for automobiles that have either been or are to be repaired. About 50% of the informal automobile workshops have vacant land as the dominant land use on the right side (Table 2) and 53.8% of the informal automobile workshops have the same land use type as the dominant land use on the rear (Table 3). As revealed by Table 4, the dominant land use type on the opposite of the informal automobile workshops is public and semipublic. These public and

semipublic uses are mostly offices of government agencies which example is Osun State Ministry of Agriculture, Ilobu road. Aligned directly opposite to this ministry is plethora of informal automobile workshops. More so, most of the workshops have few residences adjoining them. While the problem of land use incompatibility has continued to create chaos and reduce environmental legibility and aesthetics, it is unfortunate that it has not been so addressed by the relevant development control agencies.

Table 2: Distance of Informal Automobile Workshops to Road and Adjoining Land use

	Total number of Workshops	Mean	Standard Deviation
Distance of workshop to road	12	10.17 meters	4.8
Distance of workshop to the closest landuse	12	6.35 meters	3.9

Table 3: Dominant Land use on the Right Side of Informal Automobile Workshops

Landuse	Frequency	Percentage
Industrial	2	16.7
Commercial	3	25.0
Vacant	6	50
Public/semi public	1	8.3
Institutional	0	0
Residential	0	0
Total	12	100

Table 4: Dominant Landuse on the Rear of Informal Automobile Workshops

Landuse	Frequency	Percentage
Industrial	0	0
Commercial	0	0
Vacant	7	58.3
Public/semi public	1	8.3
Institutional	0	0
Residential	4	33.3
Total	12	100

Table 5: Dominant Landuse on the Opposite of Informal Automobile Workshops

Landuse	Frequency	Percentage
Industrial	3	25.0
Commercial	1	8.3
Vacant	1	8.3
Public/semi public	5	41.7
Institutional	0	0
Residential	2	16.7
Total	12	100

Land Acquisition

Figure 3 shows that 50% of the land utilized for informal automobile workshops in the study area are rented either from individuals or government agencies. However, close to half (42%) of the selected workshops are sited on encroached government reserved areas such as power line areas among others. These lands are supposed to be setbacks to high tension power cables that run over them but the problem of ineffectiveness of development control agencies has left the land ‘in control’ of automobile artisans who erect temporary structures at will. The average annual rent paid for acquired land is approximately ₦10,000 which is either paid to individuals (in the case of

individual lands) or illegally to government officials (Government Reserved Areas) where the latter issue no receipts but only assure artisans of non-disturbance, and in some other cases, spaces are occupied as illegal squatters. The disturbing issue is that their continuing stay at their various places is largely dependent on the owners of the parcels of land being used, who may choose to force them to leave, or issue quit notice, and disband them at will. This may threaten the effectiveness of any form of control of the land use based on the existing unwritten ‘land tenure system’ the artisan operates on, except conscious planning is done to control the location, planning, management and acquisition of spaces of such activities.

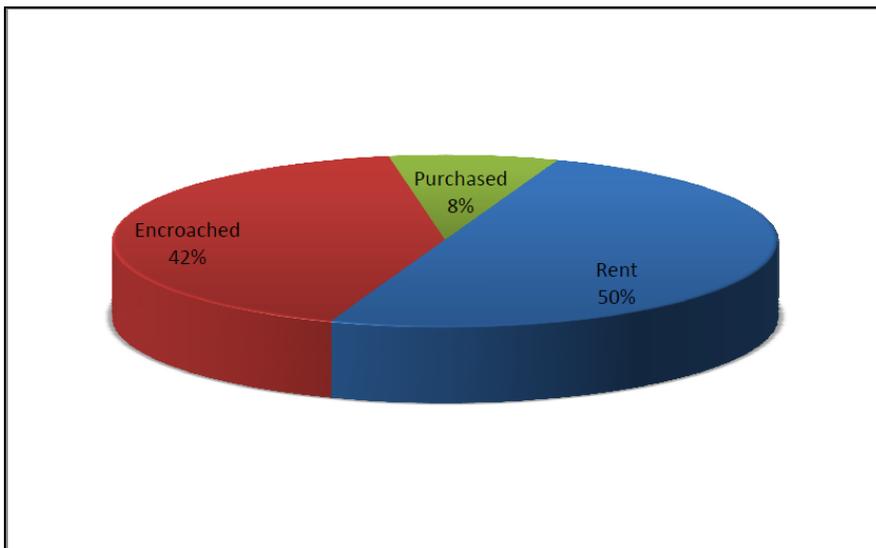


Fig 3: Mode of Land Acquisition

Conclusion and Recommendation

This study has established that informal automobile workshops, though linearly arranged along major roads, are randomly distributed, could spring up beside, behind, directly opposite of any form of physical development to distort the existing land use plan (if any) and/or generate negative impacts on the adjoining land uses. The study opines that with necessary physical or land use planning machinery, particularly establishment of mechanic complex with specified land use standards for informal automobile workshops, and effective implementation of same (as highlighted in the recommendations below), development of informal automobile workshops could be formalized and controlled. This would not only boost the image of the operators (artisans), but also help the government in keeping records of the sector and in its taxation drive both as an urban land use and as an integral component of the urban economy.

Establishment of Mechanic Complex

The need for automobile artisans' agglomeration to aid not only efficiency but also control must be acknowledged and this can be catered for with establishment of Mechanic Complex. A mechanic complex is a self-sufficient and enclosed facility where automobile artisans of different specializations are organized and expected to be operating and relating. The mechanic complex should be divided into sections based on different areas of specialization of automobile artisans. It will have in itself complementary facilities and services like health centres, police posts, Automated Teller Machine posts, public toilets and central waste collection centre among others. It will also have its

development agency that will be in charge of space allocation and overall management of the complex. Aside the promotion of efficiency, establishment of mechanic complex will cater for the accommodation of displaced automobile artisans who may be victims of development control exercise. Proposed automobile complex is to be located along Ede road. The choice of this location is hinged on the fact that Ede road is one of the major roads in the state capital and can accommodate a relatively large volume of traffic. Also, the area is a developing one with little and scanty physical development. Hence introduction of such facility in the area will on one hand save the cost of demolition needed for opening up space in other developed areas of the state capital and on the other open up the area to socio economic development. However, this development must be guided through non-diffusing development control measures such as maintenance of setback and buffering of activities among others.

Automobile artisans, in quest for space in the proposed mechanic complex, must be duly registered with the Mechanic Complex Development Authority (MCDA), which should be established by the State Government and be an organ of the relevant ministry at the state level). Mode of space allocation in the mechanic complex should be rentage at moderate and reasonable prices to be so agreed upon with all categories of stakeholders.

Mandatory routine sanitation exercise should be done regularly in the complex to ensure effective management of waste. Also oil and grease spills from different workshops should be channelized through drains to a central basin where it will be further treated by the MCDA. The

establishment of the complex should involve all categories of stakeholders (including artisans, motorists, planning authority and/or development control agencies, property developers) right from the beginning to the end. They should be well sensitized and involved in the design of the complex.

Mechanic complex should be landscaped and partitioned into sections based on different areas of specialization in automobile servicing. Landscaping and buffering of mechanic complex will not only create a conducive, humane and aesthetically pleasing environment, it will also aid in the removal of air pollutants. Partitioning of mechanic complex into sections should aid the agglomeration of specialists which will be producing similar waste for which appropriate waste reduction apparatus and management strategies can be applied. For example, fairly enclosed walls should be erected to reduce the escape of air pollutants during spraying. A radius of 500 meters should be maintained from the mechanic complex to the nearest adjoining development to serve as buffer zone characterized with tree plantation to encourage a green society and aid environmental sanity.

Standardization of Automobile Workshop Requirements

Less focus has been placed on informal activity by government and this has given a free channel for all and sundry to carry out such activity in any way best known and practicable to them. In a bid to curb this, there is need to establish standards and limits either for the mechanic complex or for general integration and formalization of the workshop as a recognized, controllable and controlled land use, with respect to number of units, minimum acreage, minimum setback to adjoining

land use, and necessary facilities to be provided. Since an average of 4 units is observable in all automobile workshops in the study area, the maximum number of units permissible in any automobile workshop should be five (5). Control of number of units will aid in the control of quantum of activities, and by extension control of intensity of impact on host environment.

A minimum acreage (area) of 12 meters by 36 meters (i.e 432 square meters) is recommended for each workshop, and for any reason, a unit increase in the number of units of automobile workshop will account for an additional 100 meters square.

No doubt the land demand of automobile workshop is enormous and its negative effect (especially noise and air pollution) is easily transmissible hence there is need for sufficient setback between automobile workshops and adjoining land uses. At least a setback of 30 meters should be maintained from automobile workshop of 5 units and adjoining land use except road. An increase in the number of units should attract additional 5 meters increase. Setback from road networks should be a minimum of 10 meters. This setback should be sufficient enough to cater for buffering, distance decay effect of unnecessary noise and air pollution, and parking space for vehicles.

Activities do agglomerate to enjoy economies of scale and social benefits but this form of agglomeration must be consciously organized to achieve maximum benefit. The adjoining land use to automobile workshop can be commercial, vacant land and industrial land use (light service). Automobile workshops should be far from land uses like educational, institutional, public and

semipublic land uses as pollution emanating from the former can reduce the efficiency of the latter.

Except in relatively established automobile workshops, they are characterized with temporary tents made either with woods or canopies and less care is given to the workshop itself. The basic necessary facilities required in automobile workshops should be well spelt out for different categories of specializations.

Development Control

The essence of development control in modern societies is to prevent the urban fabric from developmental ills through the organization and reorganization of physical development. Development control is a veritable tool in the hand of town planners and such can be used in the spatial reorganization of the study area. Certain areas of the town should be made prohibitive to informal automobile workshops. Development control strategies that can be used include demolition, removal and prohibition of non-conforming development (automobile workshops inclusive).

Informal automobile workshops in a non-conforming area should be sealed and such automobile artisans fined. Also, fairly established automobile workshops with minor compliance defects should be forced to upgrade within a specified period of time or be made to face the wrath of eviction. Approval should be granted to automobile artisans before the establishment of automobile workshops, such approvals may be temporary or semi-permanent, depending on the type and quantum of activity. The approvals may also be revoked if certain conditions are not met, or for the overriding public interest. Routine inspection of automobile workshops should be carried out by

development control officials to ensure total conformity of automobile artisans to planning standard.

More studies are, however, recommended to: (1) provide for issues pertaining to detailed land use planning of such mechanic village, (2) unravel the economic sustainability of this proposed formalization process.

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